GDT 129

A. Scope

For a complete list of GDTs, see the Table of Contents.

Use this test method to determine the percentages of flat and elongated particles in coarse aggregate.

1. Referenced Documents

   AASHTO Standards

   M92 Wire-cloth Sieves for Testing Purposes

   M231 Weighing Devices Used in the Testing of Materials

   T 2 Methods of Sampling Aggregates

   T 27 Method of Test for Sieve Analysis of Fine and Coarse Aggregates

   T 248 Method of Test for Reducing Field Samples of Aggregate to Testing Size

2. Definitions

   Flat and Elongated Particles in Coarse Aggregate – those particles of coarse aggregate having a ratio of length to average thickness greater than a specified value.

3. Summary Of Test Method

   Individual particles of aggregate are measured to determine the ratios of length to average thickness.

4. Significance And Use

   a. Flat or elongated particles of aggregates, for some construction uses, may interfere with consolidation and result in harsh, difficult to place material. These type particles tend to orient horizontally along the particles longest axis and contribute to rutting susceptibility, particularly in bituminous mixes.

   b. This test method provides a means to examine particles for compliance with specifications that limit flat and elongated pieces.

B. Apparatus

1. A vernier-type caliper accurate to 0.001 in (0.03 mm) and capable of measuring particles up to 2.5 in (63 mm) in size.
2. Scale – the scales used shall be accurate to 0.5% of the mass of the sample.

C. Sample Size and Preparation

Sample the coarse aggregate in accordance with AASHTO T 2.

1. Perform a sieve analysis on the sample in accordance with AASHTO T 27 and discard all material that passes the No. 4 (4.75 mm) sieve. Recombine and thoroughly mix the remainder of the sample.
2. Based on the gradation as determined by AASHTO T 27 and the table below, look to the left side of the table and select the nominal maximum sieve size (the smallest sieve size that more than 90% of the sample will pass through).
3. Next, look to the top row of the table and find the largest sieve size that less than 10% of the sample will pass through. The mass (in grams) listed where the two sieve sizes intersect is the minimum mass of material to be tested.
4. In the event that more than 10% of the sample passes the No. 4 sieve (4.75 mm), use the mass listed in the row where the nominal maximum sieve size in the left column and the No. 4 sieve column intersect.
5. Reduce the sample in accordance with AASHTO T 248 to obtain the representative sample size determined from the above procedure.

Nominal Maximum Sieve Size	No. 4 (4.75 mm)	3/8" (9.5 mm)	1/2" (12.5 mm)	3/4" (19.0 mm)	1" (25.0 mm)	1-1/2" (37.5 mm)
3/8" (9.5 mm)	100					
1/2" (12.5 mm)	300	200				
3/4" (19 mm)	900	800	600			
1" (25 mm)	2400	2300	2100	1500		
1-1/2" (37.5 mm)	6900	6800	6600	6000	4500	
2" (50 mm)	18800	18600	18600	18000	16500	12000

NOTE: As well as consisting of the minimum mass that is specified above, ensure that a sample consists of at least 150 particles.

D. Procedures

1. Measure each particle in the sample to determine its length and **average** thickness. The particle is flat and elongated if its length exceeds the specified ratio of length to **average** thickness. The specified ratio depends on the intended use of the aggregate.

   $T_{(1,2,3)}$ = measured thickness
   $T_{avg.}$ = average thickness
   L = measured length

   $(T_1 + T_2 + T_3) / 3 = T_{avg}$.

   For Example:
   5:1 ratio - If $L > (5 \times T_{avg})$, then the particle is flat and elongated.
   3:1 ratio - If $L > (3 \times T_{avg})$, then the particle is flat and elongated.

2. After the particles have been classified into categories as flat and elongated or not flat and elongated, calculate the percent flat and elongated particles of the sample.

E. Calculations

1. Determine the dry total weight of particles for each sample tested.
2. Determine the dry total weight of particles for each sample classified as flat and elongated.
3. Calculate the percentage of each particle size for each sample classified as flat and elongated.
4. The calculation will be:

   $A = (B \div C) \times 100\%$

   where:
   A = percent flat and elongated
   B = dry weight of flat and elongated particles
   C = total dry weight of sample

F. Report

Report results to the nearest 0.1%.